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USAF PILOT TRAINING COMPLETION AND RETENTION: A TEN YEAR FOLLOW-UP ON PSYCHOLOGICAL TESTING

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A number of studies have examined the intelligence and personality of pilots. Few, however, have been able to utilize long term follow-up data. Three-hundred and fifty Air Force officers undergoing Undergraduate Pilot Training were administered the Multidimensional Aptitude Battery, the Personality Research Form, and the Millon Clinical Multiaxial Inventory. Ten year follow-up data is provided on pilot training completion and length of service. No differences were found among the training completions groups but a number of consistent personality variables were correlated with length of service.

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PREFACE

This project was completed under the AFOSR Summer Faculty Research Program.

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USAF pilot training completion and retention: A ten year follow-up on psychological testing

SUMMARY

A number of studies have examined the intelligence and personality of pilots. Few, however, have been able to utilize long-term follow-up data. Three-hundred and fifty Air Force officers undergoing Undergraduate Pilot Training were administered the Multidimensional Aptitude Battery, the Personality Research Form, and the Millon Clinical Multiaxial Inventory. Ten year follow-up data is provided on pilot training completion and length of service. No differences were found among the training completions groups but a number of consistent personality variables were correlated with length of service.

INTRODUCTION

Background

Reviews of the literature on personality and pilot personnel issues have generally found few predictive relationships (Dolgin and Gibb, 1988). No single test or variable has emerged which is widely accepted as adding a great deal of predictive validity to pilot selection or training outcome. Still, there remain a few studies which suggest a number of global personality characteristics such as self-confidence and flexibility that can aid, to a small degree, in the prediction of such things as training outcome in the US Air Force (Siem, 1992). It is difficult to know if the lack of personality prediction is a function of true lack of association, poor psychological tests, or limited and early outcome data. No study thus far has looked at multiyear follow-up.

Retzlaff and Gibertini (1988) presented psychological data on 350 US Air Force pilot training students. Testing included scales of intelligence, personality, and psychopathology. The Multidimensional Aptitude Battery (MAB; Jackson, 1985) was used to assess intelligence. Full Scale intelligence (IQ) was found to be 120 for the group. The ten subtests showed mean performances about one standard deviation above the normative mean. The Personality Research Form (PRF; Jackson, 1984) provided data on personality characteristics. Student pilots were found to be higher on scales of affiliation, cognitive structure, dominance, and social desirability than a college student control sample. The student pilots were also lower on scales of abasement, autonomy, harm avoidance, and understanding than the other sample. Finally, the Millon Clinical Multiaxial Inventory (MCMI; Millon, 1983) was used to assess psychopathology. The only findings here was evidence of histrionic and narcissistic personality features. All of these data were provided as a norm sample against which clinically referred pilots might be compared.

Additional statistical work pointed to three prototypical types of aviator (Retzlaff and Gibertini, 1987). The first cluster was dubbed the "Right Stuff". This group was aggressive, dominant, exhibitionistic, impulsive, and playful. The second group, the "Company-man", had more achievement, endurance, affiliation, and order traits. Finally, the last group, the "Wrong Stuff", had the lowest scores of all on exhibition, understanding, affiliation, and achievement. This work was cross-validated by method, sample, and test showing a remarkable stability of structure. While making intuitive sense, no follow-up data was available to these researchers at that time to validate this typology.

Picano (1991) replicated this three cluster solution finding three nearly identical personality types in experienced aviators. This is of particular interest given the use in that study of a completely different personality test, one optimized to occupational interaction. While no differences across clusters were found for variables such as type of mission flown, one cluster included more instructor rated pilots than the other two clusters. More generally, the aviators were found to be different from a normative sample on 22 of 31 scales, indicating a more general "pilot personality" above and beyond the three clusters specifically.

Current testing in the USAF Enhanced Flight Screening program (King and Flynn, in press), other USAF programs (Flynn, Sipes, Grosenbach, and Ellsworth, 1994), and within NASA's astronaut selection procedure includes the intelligence test used by Retzlaff and Gibertini. Personality testing has continued in the AF but with the newer Revised NEO Personality Inventory (NEO-PI-R; Costa and McCrae, 1992). Formal testing for psychopathology has been found to be of limited value with these relatively high functioning individuals (King, 1994).

Purpose

The purpose of the current study was to follow-up the 350 student pilots tested by Retzlaff and Gibertini. Specifically, completion of Undergraduate Pilot Training (UPT), subsequent aviation rating, and 10 year service retention were of interest.

METHOD

Subjects

Subjects for this study were 350 white males who entered United States Air Force Undergraduate Pilot Training at Reese Air Force Base, Texas between December 1984 and September 1985. Ages at the time ranged from 22 to 27 years. Subjects were administered the Multidimensional Aptitude Battery (N=145), Personality Research Form (N=340), and Millon Clinical Multiaxial Inventory (N=249) in classes of 50 to 55 within the first 4 weeks of training.

Approximately ten years after testing (June 1995), UPT completion, aviation rating, and length of service were extracted from computerized records of active duty officers and separated officers by the Armstrong Laboratory, Decision Support Branch technical staff. UPT completion was indicated by having an aviation rating of pilot. Rated navigators either were so rated prior to UPT and failed pilot training or went to Undergraduate Navigator Training after an unsuccessful attempt to complete UPT. Those with no rating were found in a wide range of AFSC's after their UPT experience.

Measures

The Multidimensional Aptitude Battery (MAB; Jackson, 1985) is a broad based test of intellectual ability. It was patterned on the Wechsler Adult Intelligence Scale-Revised (WAIS-R), the most widely used individually administered test of intelligence. While the WAIS-R requires about an hour and a half per subject to individually administer, the MAB can be given to large groups in about the same amount of time. Additionally, the WAIS-R requires skillful scoring while the MAB has a multiple choice format. All subtests in the WAIS-R have corresponding paper and pencil subtests in the MAB except immediate digit memory. Verbal components tapped include information (INFO), comprehension (COMP), arithmetic (ARITH), similarities (SIM), and vocabulary (VOCAB). Performance measures include digit symbol coding (DIGSYM), picture completion (PIXCOMP), spatial (SPAT), picture arrangement (PIXARR), and object assembly (OBJASS). Scores on each of the subtests are scaled to a mean of 50 and a standard deviation of 10. Verbal (VERBAL) and performance (PERF) IQ's are available as is a full scale (FULL) IQ, each scaled to a mean of 100 and a standard deviation of 15. Reliabilities for the summary scores range from .94 to .98, and the correlation with the WAIS-R is .91.

The Personality Research Form (Jackson, 1984), Form E, is a 352 true-false item, 22 scale inventory of normal personality traits. Twenty scales tap domains of interest in the aerospace environment including abasement (AB), achievement (AC), affiliation (AF), aggression (AG), autonomy (AU), change (CH), cognitive structure (CS), defendence (DE), dominance (DO), endurance (EN), exhibition (EX), harm avoidance (HA), impulsivity (IM), nurturance (NU), order (ORD), play (PL), sentience (SE), social recognition (SR), succorance (SU), and understanding (UN). The twenty-first scale is a validity scale which attempts to assess highly infrequent (IN) item response indicative of random test response. The twenty-second scale assesses the degree of social desirability (SD) of the subject's responses. Scores range from 0 to 16 on each of the scales. Reliabilities range from .57 to .91.

The Millon Clinical Multiaxial Inventory (MCMI) (Millon, 1983) is a 20 scale instrument which was developed to measure dimensions consistent with modern psychiatric diagnostic

nomenclature (Diagnostic and Statistical Manual-III; American Psychiatric Association, 1980). It assesses eight basic personality patterns (schizoid (SC), avoidant (AV), dependent (DD), histrionic (HI), narcissistic (NA), antisocial (AN), compulsive (CO), and passive aggressive (PA)), three pathological personality patterns (paranoid (PA), schizotypal (ST), and borderline (BO)), and nine clinical syndromes (anxiety (AX), somatoform (SO), hypomania (HY), dysthymia (DY), alcohol use (AL), drug use (DR), psychotic thought (PT), psychotic depression (PD), and delusions (DL)). The last scale is a weight (WE) indicator of over and under reporting psychopathology. The cut-off score for clinically significant elevations is 74 on all scales. Scores above 84 indicate the most prominent elements in the patient's clinical picture. While this instrument was developed for use with pathological populations, it's basic personality scales are useful in normal groups (Retzlaff and Gibertini, 1987) and its clinical syndrome scales may provide a good screening for mood disruptions such as anxiety and depression. It must be noted that the alcohol, drug, and psychotic scales of this version of the MCMI are extremely poor psychometrically (Gibertini, Brandenburg, and Retzlaff, 1986) and should not be used with student pilots or other high functioning individuals. Its basic personality scale reliabilities range from .73 to .91.

RESULTS

Table 1 presents the descriptive statistics for the MAB for not only the entire sample but also for the three training outcome groups individually. As can be seen, the Full Scale IQ scores of the entire sample are well above average at 120. Performance scores are slightly above Verbal IQ scores. The subtest scores are T statistics which have a mean of 50 and a standard deviation of 10 in the normative sample. Additionally, all pilot subtest scores are about 1 standard deviation above the normative sample.

The only significant difference among the three outcome groups is on the Arithmetic variable with those becoming pilots having the highest scores. The three point difference between the highest and lowest group, however, is quite modest. There are no differences in any of the other summary or subtest scores across the three groups. Those who became pilots, navigators, or who were not subsequently rated showed few differences on this cognitive testing.

PRF personality variables are presented in Table 2. Again, these student pilots are higher than college students on affiliation, cognitive structure, dominance, and social desirability. They are lower on abasement, autonomy, harm avoidance, and understanding (Jackson, 1984; Retzlaff and Gibertini, 1987). This finding, of course, may be a reflection of differences in age, education, or other moderating variables between student pilots and college students.

The mean raw scores for the three outcome samples are not statistically different. Interestingly, the largest, though nonsignificant, difference is on the Achievement variable.

The MCMI (Table 3) points to predominant histrionic and narcissistic patterns of personality. This personality constellation is highly consistent with lay impression of the pilot as a highly sociable person who has strong self-esteem. Very little, if any, clinical pathology is seen. Although base rate scores in the clinical range (BR > 84) were found for some subjects on 9 scales, only 3 of these (Narcissistic, Histrionic, and Antisocial) had positive rates greater than the rate of false positives (Millon, 1983) found in clinical samples. While "psychiatric pathology" is not expected, moderate elevations are usefully interpreted. Indeed, some scales' elevation or lack of elevation may be more meaningful than others. King (1994) points to typical aviator elevations on Narcissistic, Histrionic, Compulsive, and Antisocial. And as such, elevations on scales such as Schizoid or Avoidant would be of far greater clinical concern.

Again, no training outcome differences are seen across the three groups. The "Right Stuff" variables do not seem to be differentiating the groups as to "getting their wings".

Table 4 provides the data on the retention outcome variable as a function of the MAB. Here length of service was trichotomized into three service commitment blocks. The first block of 5 and less years of service is indicative of initial separation from service as well as those not completing flight training but remaining on in the service briefly in some other occupational capacity. The second block of 6 to 9 years is typical of those completing UPT, "earning their wings", and only serving out their initial commitment. The final block is reflective of those who chose to stay on in the AF beyond their initial commitment and are still on active duty. Almost invariably these were pilots as will be seen later.

Comprehension showed a statistically significant difference among groups. This is probably due to a statistical artifact. There were only 13 subjects in the less than 5 years group and they all had very similar Comprehension scores. This similarity resulted in a standard deviation of only 1 point. This no doubt lead to the statistical significance. No summary IQ scores or other scale scores rose to the level of statistical significance across the three groups.

Table 5 provides the total and three subsamples' PRF means and standard deviations. Here Play showed significant differences across the three groups. The least Playful are found to remain on active duty 10 years after training. The most Playful stayed in the service the least amount of time. Other variables which approached significance were Achievement and Social Desirability. The "still on AD" group had the highest

Achievement scores and Social Desirability scores.

Table 6 presents the length of service outcome by MCMI. Only one significant difference was found across the three groups. The group spending the least amount of time in the service was the most dysthymic, a form of mild to moderate depression or dysphoria. These scores, however, are well below the clinically relevant range and therefore may reflect some subclinical narrow aspect of dysthymia. As testing was accomplished well before any training began, this is probably not a situational reaction to imminent discharge. The largest, although non-significant, difference is found on the Compulsive variable with those highest spending the most time in service. This would be consistent with the Play results of the PRF.

Tables 7, 8, and 9 present the testing data and length of service data in a more continuous manner. Here the test scores are correlated with number of years in service. No significant correlations are found with the MAB intelligence data. Two correlations are significant (although only at a .05 level) on the PRF data. Achievement is positively correlated with length of service, and Play is negatively correlated. For the MCMI, Compulsive is positively correlated with service retention.

Finally, the current outcome data were compared to the clusters developed by Retzlaff and Gibertini (1987). That cluster solution presented three pilot types which were dubbed 1) the "right stuff", 2) the "company-man", and 3) the "wrong stuff". The discriminant functions found in the 1987 work were used to recreate the three cluster solution, as would and can be done with any new pilots with the proper raw data.

The training outcome by cluster type matrix is found in Table 10. No systematic association is seen in this matrix between cluster type and subsequent training outcome. The Chi Square is 1.679 and, with 4 degrees of freedom, is not significant with a p value of only 0.7945.

The service retention grouping by personality cluster type matrix was also found to be nonsignificant (Table 11). No association between the three personality cluster and the three length of service groups was found. The Chi Square is 2.340 and, with 4 degrees of freedom, is not significant with a p value of only 0.6735.

The service retention data was also analyzed by cluster type from an analysis of variance (ANOVA) perspective. Here cluster one remained in service an average of 7.3 (sd 3.2) years, cluster two remained 7.9 (sd 2.9), and cluster three 8.0 (2.7). This results in an F of 1.05, which is not significant.

Table 12 presents the matrix of training outcome by length of service grouping. The Chi Square is 111.571 and, with 4 degrees of freedom, is highly significant with a p value of less than .0001. Here, those who completed pilot training were far

more likely to still be on active duty. Those who failed to complete pilot training were most likely to be discharged from the service quite early.

It is important to note the limitations of the statistics used in this study. The use of up to 20 univariate tests whether ANOVA or correlation in nature is acknowledged as questionable for authoritative inferences. These tests are used largely to make initial descriptive comparisons across groups. Should any of the measures have resulted in several significant univariate tests, further, more conservative, multivariate procedures would have been employed. Multiple differences not having been found, it is our view that the differences seen in this work are of suggestive, not definitive, nature.

DISCUSSION

The most dramatic finding of these outcomes measures is how little of pilot training completion and service retention is predicted by the intelligence, personality, and psychopathology testing instruments. Large amounts of variance are not predicted.

The pilot training outcome data appears to be generally independent of the intelligence testing given to the officers as students. Some differences may be related to arithmetic ability, although this must be replicated.

Indeed, the current results are not a reason to believe cognitive variables such as IQ are not important in the completion of pilot training. The IQ's of these subjects are well above the population as a whole. It in many ways is a statistical forgone conclusion that IQ will not predict training outcome because many of the screening criteria for pilot training opportunity are highly correlated with IQ. For example, admission to the Air Force Academy is contingent upon high school grades and college entrance tests, both highly correlated with IQ. Selection for pilot training after the Academy is based upon the technical nature of the undergraduate major and undergraduate grades. Again, both variables are highly correlated with IQ. In essence, IQ is probably so predictive of pilot training outcome that it is already a major, albeit embedded, portion of the selection criteria.

Neither the test of personality nor the test of psychopathology predicted training outcome. It must be pointed out, however, that all students failing pilot training for any reason were combined. This was done in order to have a sufficiently large sample of training failures to meet the statistical design requirements. In doing so, however, those who were eliminated for poor flying, which was the vast majority, were combined with a number of students who were eliminated due to medical conditions (e.g., high blood pressure), fear of flying, air sickness, or administrative problems. It is apparent

that a very large initial sample is necessary to separate out all of these reasons for UPT noncompletion.

More interesting data is seen in the service retention numbers. Intelligence testing is of limited outcome value for many of the same reasons stated above. Here small, but consistent, findings are seen across personality tests and across methodologies. It would appear that playful, short-sighted individuals are not retained in the AF. Here, achievement-oriented, conforming, and compulsive-type individuals tend to remain on active duty past their initial "pay back" commitments. Decisions regarding continued military careers were brought into sharp focus for this particular cohort with the Gulf War occurring at about the time their initial commitment was complete. With the cost of training new pilots and the consequent loss of experience, retention potential may be of particular interest.

There is also a question as to whether it is wise to develop clusters and types of pilots such as the "right stuff" or "wrong stuff" prototypes. While there seems to be an appeal in the simplicity of a limited number of "types", this taxonomic approach does not appear to be validated by actual outcomes. In the current study, this approach to simplifying the data left behind true outcome prediction ability.

There were a number of problems with the current study. The forced combination of UPT failures has been noted. All tests were not given to all subjects, so some sample sizes were quite low, such as with the MAB. It is possible that larger numbers of subjects here may have presented significant differences. It is also unfortunate that more specific outcome data could not have been collected, such as surveys as to reasons for service separation or service satisfaction.

While relatively few differences were found, it must be remembered that many tests that do not function well in the prediction of large numbers of subjects behave quite well in certain situations with a single subject. These tests are still quite useful clinically in the identification of pilots with intelligence well below the norm or scores indicative of psychopathology, such as depression or severe personality disorder.

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Table 1

MAB Means, SDs, and F Tests for UPT Completion.

	ALL		Pilots		Navigators		No Rating		
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F(2,130)
INFO	57	6	57	5	60	4	57	6	1.76
COMP	57	4	57	4	56	8	58	2	0.31
ARITH	62	5	62	5	60	4	59	7	3.44*
SIM	58	6	58	5	60	4	56	9	1.84
VOCAB	57	6	57	7	59	4	55	6	1.46
DIGSYM	61	7	61	7	61	6	61	8	0.05
PIXCOMP	57	5	58	5	58	4	56	6	0.72
SPAT	61	7	61	7	61	7	60	5	0.15
PIXARR	63	8	63	8	62	10	64	7	0.29
OBJASS	58	6	58	6	56	6	59	5	0.69
VERBAL	116	7	116	7	119	6	114	8	1.44
PERF	121	10	121	10	120	12	121	10	0.06
FULL	120	8	120	8	121	9	119	9	0.30
N	133		94		14		25		

Note: * .05 level of significance = 3.07, .01 = 4.78.

Table 2

PRF Means, SDs, and F Tests for UPT Completion.

	ALL		Pilots		Navigators		No Rating		
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F(2,298)
AB	6.1	2.5	6.3	2.4	5.7	2.8	5.7	2.8	1.54
AC	12.0	2.6	12.2	2.5	11.8	3.1	11.3	2.8	2.87
AF	10.9	3.3	10.9	3.2	11.5	3.5	10.4	3.3	0.93
AG	7.5	3.0	7.5	2.9	7.7	3.0	7.6	3.3	0.10
AU	6.7	2.9	6.6	2.9	7.2	3.3	6.7	2.7	0.39
CH	9.5	2.6	9.6	2.6	10.5	1.9	9.0	2.8	2.85
CS	10.2	2.8	10.2	2.7	10.3	3.1	10.3	2.9	0.05
DE	5.5	3.2	5.6	3.3	5.0	2.4	5.6	3.1	0.41
DO	12.6	2.5	12.5	2.6	13.4	1.9	12.8	2.4	1.39
EN	11.2	2.5	11.3	2.4	10.3	2.9	11.1	2.5	1.41
EX	9.1	3.8	9.2	3.8	9.6	3.2	8.6	4.1	0.74
HA	5.5	3.0	5.5	2.8	5.5	3.0	5.5	3.5	0.01
IM	5.0	3.4	5.1	3.1	4.7	4.2	4.9	3.8	0.13
NU	9.6	2.7	9.7	2.8	9.1	3.0	9.5	2.2	0.59
ORD	8.4	4.0	8.3	4.0	8.7	4.6	8.7	4.0	0.24
PL	8.6	2.9	8.7	2.9	7.8	2.4	8.6	3.4	0.88
SE	8.8	2.9	8.7	3.0	8.4	2.7	9.4	2.6	1.66
SR	8.8	3.0	8.9	3.0	9.1	3.3	8.3	3.2	0.80
SU	5.8	3.4	5.8	3.4	5.7	2.5	5.8	3.8	0.01
UN	8.1	3.1	7.9	3.0	8.6	3.1	8.6	3.2	1.29
IN	0.3	0.7	0.2	0.6	0.1	0.3	0.4	0.9	1.60
SD	13.5	1.9	13.5	1.9	13.2	2.2	13.3	2.0	0.64
N	301		219		23		59		

Note: .05 level of significance = 3.03, .01 = 4.68. No F statistics are significant.

Table 3

MCMI Means, SDs, and F Tests for UPT Completion.

	ALL		Pilots		Navigators		No Rating		
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F(2,212)
SC	22	14	21	14	22	13	25	14	1.07
AV	19	16	18	16	16	15	22	17	1.30
DD	42	19	43	19	38	15	41	22	0.45
HI	71	17	71	17	69	20	71	15	0.07
NA	72	15	72	15	70	13	71	14	0.13
AN	65	15	65	15	64	11	65	15	0.03
CO	67	10	68	10	65	13	66	10	0.73
PA	24	16	24	15	21	19	26	18	0.78
ST	31	18	30	18	31	19	33	18	0.35
BO	35	17	34	17	33	16	37	18	0.68
PR	59	13	59	13	57	9	60	13	0.21
AX	44	21	44	21	40	20	48	19	1.09
SO	54	15	54	16	51	17	55	14	0.51
HY	43	27	45	27	32	26	42	28	1.65
DY	42	20	40	20	43	17	48	19	2.28
AL	32	14	32	14	26	13	33	14	1.71
DR	54	17	54	18	52	17	55	16	0.24
PT	32	19	32	19	29	20	35	20	0.53
PD	23	19	21	19	21	19	28	18	2.20
DL	48	18	49	18	41	17	48	16	1.39
WE	1	2	1	2	1	1	1	2	0.04
N	215		151		17		47		

Note: .05 level of significance = 3.04, .01 = 4.71. No F statistics are significant.

Table 4

MAB Means, SDs, and F Tests for Length of Service

	All		Years: 0 to 5		Years: 6 to 9		Years: Still AD		
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F(2,132)
INFO	57	6	60	3	57	7	57	5	1.24
COMP	57	4	59	1	56	6	58	3	3.36*
ARITH	62	6	60	7	61	6	62	5	0.75
SIM	58	6	56	7	58	6	58	6	0.55
VOCAB	57	6	58	4	56	8	57	6	0.83
DIGSYM	61	7	63	7	59	8	61	7	1.48
PIXCOMP	57	5	58	4	57	5	58	5	0.17
SPAT	61	7	61	4	60	8	61	7	0.26
PIXARR	63	8	66	6	62	8	64	8	1.28
OBJASS	58	6	59	5	57	7	59	5	1.18
VERBAL	116	7	117	5	115	8	117	7	1.45
PERF	121	10	123	9	118	12	121	9	1.63
FULL	120	8	122	7	117	9	121	8	2.32
N	135		13		43		79		

Note: * .05 level of significance = 3.07, .01 = 4.78.

Table 5

PRF Means, SDs, and F Tests for Length of Service

	All		Years: 0 to 5		Years: 6 to 9		Still AD		
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F(2,301)
AB	6.1	2.6	6.1	3.0	6.2	2.5	6.1	2.5	0.07
AC	12.0	2.6	11.3	2.9	11.8	2.7	12.3	2.4	2.87
AF	10.9	3.3	11.1	3.4	10.9	3.6	10.9	3.0	0.09
AG	7.5	3.0	6.9	3.4	8.0	3.0	7.4	2.9	2.09
AU	6.6	2.9	7.0	3.1	7.0	2.9	6.3	2.8	1.94
CH	9.5	2.6	9.2	2.7	9.6	2.6	9.5	2.5	0.46
CS	10.2	2.8	10.2	2.6	9.9	3.1	10.5	2.6	1.41
DE	5.5	3.2	4.6	2.5	5.8	3.6	5.6	3.0	1.92
DO	12.6	2.5	12.5	2.9	12.7	2.4	12.6	2.5	0.13
EN	11.2	2.5	11.0	2.6	11.0	2.3	11.4	2.5	0.87
EX	9.1	3.8	9.6	4.5	9.5	3.8	8.8	3.6	1.40
HA	5.5	3.0	5.6	3.0	5.2	2.9	5.7	3.0	0.90
IM	5.0	3.4	5.2	3.4	5.4	3.6	4.7	3.2	1.56
NU	9.6	2.7	9.2	2.4	9.6	2.8	9.8	2.7	0.78
ORD	8.4	4.1	8.1	4.1	8.5	4.3	8.4	3.8	0.15
PL	8.6	2.9	9.4	3.6	9.0	2.9	8.1	2.7	4.43*
SE	8.8	2.9	9.3	2.6	9.0	3.0	8.6	2.8	1.25
SR	8.8	3.0	8.0	3.1	8.8	3.1	9.0	2.9	1.64
SU	5.8	3.4	5.7	3.7	6.1	3.1	5.7	3.5	0.38
UN	8.1	3.1	8.5	3.3	7.9	3.2	8.2	2.9	0.61
IN	0.3	0.7	0.3	1.0	0.3	0.7	0.2	0.5	0.09
SD	13.5	1.9	13.5	1.9	13.1	2.2	13.7	1.7	2.52
N	304		39		108		157		

Note: * .05 level of significance = 3.03, .01 = 4.68.
Subsequent stepwise discriminant function analysis results in only the inclusion of Play in the equation.

Table 6

MCMI Means, SDs, and F Tests for Length of Service.

	All		Years: 0 to 5		Years: 6 to 9		Still AD		
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F(2,213)
SC	22	14	22	15	21	13	23	14	0.42
AV	19	16	20	17	19	17	19	16	0.10
DD	42	19	43	23	42	19	42	19	0.04
HI	71	17	76	17	71	18	69	16	2.36
NA	72	15	74	17	72	15	70	14	0.85
AN	65	15	65	18	65	14	65	14	0.03
CO	67	10	64	11	67	11	68	9	2.77
PA	24	16	28	19	24	16	23	14	1.24
ST	31	18	34	17	30	19	31	18	0.64
BO	35	17	37	17	36	16	33	18	0.96
PR	59	13	60	14	60	12	58	13	0.53
AX	44	21	46	19	45	22	44	21	0.23
SO	54	15	57	14	53	16	54	15	0.85
HY	44	27	48	32	44	26	42	26	0.57
DY	42	20	50	17	39	20	42	20	3.91*
AL	32	14	34	15	33	12	30	14	1.46
DR	54	17	58	16	55	17	53	18	1.22
PT	32	19	36	19	32	18	31	20	0.82
PD	23	19	28	18	23	19	21	19	1.72
DL	48	18	46	17	48	17	48	19	0.19
WE	1	2	1	2	0	1	1	2	0.67
N	216		37		80		99		

Note: * .05 level of significance = 3.04, .01 = 4.71.

Table 7

MAB Correlations with Length of Service

Variable	r
INFO	-0.0604
COMP	-0.0057
ARITH	0.1192
SIM	0.0874
VOCAB	0.0169
DIGSYM	0.0244
PIXCOMP	-0.0078
SPAT	0.0118
PIXARR	-0.0725
OBJASS	0.0465
VERBAL	0.0564
PERF	-0.0001
FULL	0.0280

Note: * .05 level of significance = .168,
.01 = .220. N=135.

Table 8

PRF Correlations with Length of Service

Variable	r
AB	0.0167
AC	0.1245*
AF	-0.0024
AG	0.0006
AU	-0.0887
CH	0.0312
CS	0.0395
DE	0.0636
DO	-0.0299
EN	0.0586
EX	-0.0868
HA	0.0252
IM	-0.0647
NU	0.0805
ORD	0.0160
PL	-0.1462*
SE	-0.0670
SR	0.0992
SU	-0.0291
UN	-0.0146
IN	-0.0265
SD	0.0684

Note: * .05 level of significance = .113, .01 = .148.
Subsequent stepwise regression results in the
inclusion of only Play in the equation. N=304.

Table 9

MCMI Correlations with Length of Service

Variable	r
SC	0.0140
AV	-0.0456
DD	-0.0128
HI	-0.1312
NA	-0.0873
AN	-0.0125
CO	0.1504*
PA	-0.1119
ST	-0.0664
BO	-0.0909
PR	-0.0550
AX	-0.0569
SO	-0.0578
HY	-0.0813
DY	-0.1211
AL	-0.1005
DR	-0.1073
PT	-0.0947
PD	-0.1250
DL	0.0206
WE	0.0532

Note: * .05 level of significance = .135, .01 = .177. N=216.

Table 10

Personality Cluster by Training Outcome Matrix

	Cluster			
Outcome	1	2	3	Totals
Pilots	42	141	36	219
Navigators	6	13	4	23
No Rating	15	34	10	59
Totals	63	188	50	301

Table 11

Personality Cluster by Length of Service Matrix

	Cluster			
Service	1	2	3	Totals
0 to 5	10	24	5	39
6 to 9	26	64	18	108
Still AD	28	102	27	157
Totals	64	190	50	304

Table 12

Length of Service by Training Outcome Matrix

	Years of Service			
Outcome	0 to 5	6 to 9	Still AD	Totals
Pilots	6	86	129	221
Navigators	1	12	11	24
No Rating	32	12	16	60
Totals	39	110	156	305